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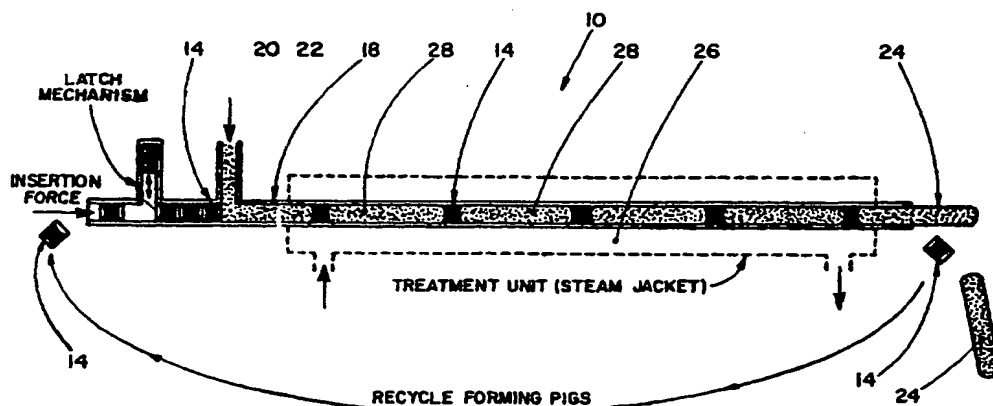
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(54) Title: UNIT PRODUCT CONTINUOUS FORMING DEVICE



(57) Abstract: The present invention is a unit product continuous forming device (10). The device (10) does not use casings, has simplicity of design, uses non-stick materials, is easily configured for making novel-shaped products, and provides control of product length and pressure in the process. The device (10) allows products which enter the process as a liquid and leave as a solid or semi-solid, such as a wiener, to be manufactured without the use of casings.

WO 00/76330 A1

UNIT PRODUCT CONTINUOUS FORMING DEVICE

This application claims the benefit of U.S. Provisional Application No.: 60/139,341 filed 6/16/99.

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BACKGROUND

Many products such as wieners are manufactured by placing a viscous, liquid batter in a disposable, cylindrical, casing material. The product is then cooked or otherwise processed. In the case of wieners, the product is immediately removed from the casing after cooking. The result is a solid or semisolid product. Units of the product are created either by cutting a continuously formed product or by periodically twisting or tying the casing to form links. Costs associated with the use of casings are high and include the purchase cost, labor for usage, and disposal costs. When casings are used to form individual links, the batter is metered, and the casing is twisted for each link, which uses expensive machinery and slows production. Additionally, the use of casings unnecessarily limits the shape of the product and creates environmental problems for casing disposal.

Much of the effort in the past for improvements has been to develop better casing materials and machines to utilize the casings. Historically, natural animal intestines were used as the casing material. Now the use of manufactured casings is widespread. Devices proposed in the past to eliminate the use of casings include reusable individual forms or pumping the product through a circular heat exchanger tube constructed of a highly conductive material such as stainless steel. Past efforts to replace the casings have failed because they were too complicated, inappropriate construction materials were used, innovative -shaped products were not created, and/or there was insufficient control of pressure and product length within the process.

In the case of individual forms for making wieners, the forms were circular in cross -section, made of rigid polymeric materials and were reusable. The disadvantages of the form system include the complexity of handling the numerous individual forms that would be required for commercial scale production. In the case of using the method of cooking a flowable food product in a continuous flow scraped surface heat exchanger, it was not commercially successful because stainless steel was used for the heat exchanger

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view of a unit product continuous forming device according to the present invention;

Fig. 2 is a perspective view of a novel shaped cooking tube and product
5 according to the present invention;

Fig. 3 is a perspective view of a novel shaped cooking tube and product according to the present invention;

Fig. 4 is a perspective view of a novel shaped cooking tube and product according to the present invention;

10 Fig. 5 is a perspective view of a pig having a novel print shape and a product having a print of the novel print shape according to the present invention;

Fig. 6 is a perspective view of a pig having a novel print shape and a product having a print of the novel print shape according to the present invention;

Fig. 7 is a perspective view of a pig having a novel print shape and a product
15 having a print of the novel print shape according to the present invention; and

Fig. 8 is a perspective view of a pig having a novel print shape and a product having a print of the novel print shape according to the present invention.

DETAILED DESCRIPTION

The present invention is a unit product continuous forming device 10. The device
20 10 does not use casings, has simplicity of design, uses non -stick materials, is easily configured for making novel -shaped products, and provides control of product length and pressure in the process. The device 10 allows products which enter the process as a liquid and leave as a solid or semi -solid, such as a wiener, to be manufactured without the use of casings.

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tube material. No one has used this method to accommodate novel -shaped products. This method relies solely on pump pressure at the inlet of the system to move the product and plugs through the tube. This reliance solely on fluid pressure means that the pressure at the inlet end must be greater than the pressure on the at the outlet end of the tube and
5 that there is little independent control of the pressure profile between the inlet and outlet. Furthermore, reliance solely on fluid pressure means that the spacing between plugs changes as the plugs move down the tube as a function of external fluid pressure, friction on inside tube walls, compressibility of the product, internal pressures generated by the product, etc. The operator then has insufficient control of the pressure on the product and
10 spacing of the plugs as the product moves down the tube, resulting in an inferior quality product.

It is an object of the present invention to provide a device which produces a product that is unit size and at least in the form of a semi-solid from a liquid or semi-solid batter without the use of casings or individual forms.

15 It is an object of the present invention to provide a device which produces novel shaped products.

It is an object of the present invention to provide a device which produces novel shapes imprinted on the ends of products.

SUMMARY OF THE INVENTION

20 The present invention is a unit product continuous forming device. The device does not use casings, has simplicity of design, uses non -stick materials, is easily configured for making novel -shaped products, and provides control of product length and pressure in the process. The device allows products which enter the process as a liquid and leave as a solid or semi -solid, such as a wiener, to be manufactured without
25 the use of casings. The device includes a cooking tube; pigs to segment the batter into units; a device to force the pigs and the batter through the cooking tube; and a device to produce a temperature change to the batter in the cooking tube in order to change the batter into the at least semi-solid formed product.

freezing, etc. or a combination of processes can be used to form a liquid batter 22 into at least a semi-solid product 24.

Figs. 2-4 show novel tubes to replace the traditional round long tube 18 of the cooking system 12. The novel tubes are used to produce novel shaped wieners 30 or other novel shaped products. Fig. 2 shows a star shaped cooking tube 18 to process the batter 22 instead of the traditional round tube 18 of Fig. 1. Fig. 2 also shows a star shaped wiener produced in the star shaped cooking tube 18. Fig. 3 shows a square shaped cooking tube 18 to process the batter 22 instead of the traditional round tube 18 of Fig. 1. Fig. 3 also shows a square shaped wiener 30 produced in the square shaped cooking tube 18. Fig. 4 shows a paw shaped cooking tube 18 to process the batter 22 instead of the traditional round tube 18 of Fig. 1. Fig. 4 also shows a paw shaped wiener 30 produced in the paw shaped cooking tube 18. The pigs 14 used in novel tubes must be similar to the novel tube 18 in cross -section, as shown in Figs. 5-8. As described above, the inside surface of the novel tube 18 and outside surface of the pigs 14 would be of the non -stick material. Another new feature incorporated into ends 32 of the pigs 14 are novel print shapes 34 extending outward from the ends 32 of the pigs 14 or inward from the ends 32 of the pigs 14. The novel print shapes 34 are used to print the novel print shape 34 on the ends 36 of the products. This will produce a print on the products which extends inward or outward on the product depending on whether the novel print shape 34 of the pig 14 extends outward or inward. Figs. 5-8 show examples novel shaped pigs 14 and novel shapes 44 on the end of wieners 42. Fig 5 shows the pigs 14 having an outward star shaped novel print shape 34 and an inward star 44 printed on the ends 36 of a round wiener 42. Fig 6 shows the pigs 14 having an outward paw shaped novel print shape 34 and an inward paw 44 printed on the ends 36 of a round wiener 42. Fig 7 shows the pigs 14 having an outward paw shaped novel print shape 34 and an inward paw 44 printed on the ends 36 of a square wiener 42. Fig 8 shows the pigs 14 having an inward paw shaped novel print shape 34 and an outward paw 44 printed on the ends of a round wiener 42. The novel shaped tubes, pigs 14 and print shapes shown in Figs. 2-8 are just examples of the many different shapes that are possible for wieners and other products.

The manufacture of wieners is mentioned as one example for the use of this

The device 10 includes a cooking system, pigs 14, and a movement system 16. The cooking system includes a long cooking tube 18 with a means 20 of inserting batter 22 and the pigs 14 into one end of the tube 18. The batter 22 is the product 24 to be cooked and the pigs 14 are used to divide the batter 22 into units of the product 24. The batter 22 and pigs 14 are forced through the tube 18 either by non -pressure means, by controlling the pressures at the inlet and/or outlet ends, or by a combination thereof. Along the path that the batter 22 moves through the tube 18, the batter 22 is cooked by using a steam jacket 26 around the tube 18 or by other cooking means. The batter 22 is continuously or semi -continuously pumped into the tube 18, which has a non-stick inside surface that contacts the batter 22. An outside surface of the pigs 14 is also of a non-stick material. One example of a non-stick surface is Teflon. The batter 22 is segmented into individual units or "links" by inserting the pigs 14 periodically into the tube 18 to separate the batter 22 into batter portions 28.

The size of each batter 22 portion can be controlled either by pumping the batter 22 into the tube 18 in portioned amounts and inserting a pig 14 after each portion enters the tube 18, or continuously pumping batter 22 into the tube 18 and inserting pigs 14 periodically. The batter portions 28, separated by pigs 14, are forced through the tube 18 by using non -pressure means, controlling the pressures at the inlet and/or outlet ends, or by a combination thereof. One example of a non -pressure means is a magnetic drive, where the pigs 14 contain either magnets or a magnetic material and an attractive magnetic moving force is supplied from outside the tube 18, whereby the pigs 14 are moved due magnetic attraction to the magnetic moving force. A non -pressure means such as the magnetic drive functions to keep the pigs 14 evenly spaced, to vary the spacing, or to modify the pressure on the portions 28 as the portions 28 and pigs 14 move down the tube 18.

A downstream section of the tube 18 is heated using a steam jacket 26 shown in Fig. 1 or by other cooking means. In this heated section the liquid batter 22 to form a wiener is partially or fully cooked and is converted from a liquid to a plastic or semi -solid material. The cooking time is controlled largely by a combination of diameter of the tube 18, length of the heated section and the flow rate of batter 22 in the tube 18. Other examples of heating methods such as microwave, chemical or enzymatic reactions, gelling,

We Claim:

1. A unit product continuous forming device to process a batter into at least a semi-solid formed product, said device comprising:
 - a cooking tube;
 - 5 pigs to segment the batter into units, said pigs fitted move inside of said cooking tube;
 - a device to force said pigs and the batter through said cooking tube; and
 - a device to produce a temperature change to the batter in the cooking tube in order to change the batter into the at least semi-solid formed product.
- 10 2. The device of claim 1, wherein said cooking tube has an inside surface that is a non-stick material.
3. The device of claim 2, wherein said non-stick material is teflon.
4. The device of claim 1, wherein said cooking tube is of a novel shape to form a
- 15 novel shaped product.
5. The device of claim 4, wherein the novel shaped product is a wiener.
6. The device of claim 4, wherein said pigs are of the same novel shape as said novel shape of said cooking tube.
7. The device of claim 1, wherein said pigs include a novel print shape on at least
- 20 one end of said pigs to print at least one end of the product.
8. The device of claim 4, wherein said pigs include a novel print shape on at least one end of said pigs to print at least one end of the product.
9. The device of claim 6, wherein said pigs include a novel print shape on at least one end of said pigs to print at least one end of the product.
- 25 10. The device of claim 1, wherein said pigs include a magnetic material and said

invention. Other uses would include manufacture of other meat products such as sausages, egg - and/or vegetable -based wieners, cereal goods such as bread or crackers, frozen desserts such as ice cream bars, and novel products such as gelatin sticks. Whereby, the batter can be processed with a cooling of the cooking tube, instead
5 of heating. The invention solves current problems by continuously or semi-continuously pumping the liquid batter into a long, non -stick tube and cooking it there. This eliminates the use of casing, and does not have the complexity of using individual, re -usable forms. Furthermore, the use of non -stick tubing material creates a better product than would be created without the non -stick material. Pressure and pig spacing are controlled along the
10 length of the tube to produce a superior quality product. The use of novel -shaped tubing and pigs allows the creation of novel -shaped products with customer appeal.

While embodiments of the invention have been described in detail herein, it will be appreciated by those skilled in the art that various modifications and alternatives to the embodiments could be developed in light of the overall teachings of the disclosure.
15 Accordingly, the particular arrangements are illustrative only and are not limiting as to the scope of the invention which is to be given the full breadth of the appended claims and any and all equivalents thereof.

device to heat the batter into the at least semi-solid formed product, the method comprising:

- inserting the batter into the cooking tube;
- inserting the pigs into the cooking tube, thereby segmenting the batter into
- 5 wieners; and
- heating the batter to form the wieners.

19. The method of claim 18, wherein an inside surface of the cooking tube is of a non-stick material.

20. The method of claim 18, wherein the cooking tube is of a novel shape to

10 produce a novel shaped wieners.

21. The method of claim 20, wherein the pigs are of a novel shape similar to the novel shape of the cooking tube.

22. The method of claim 18, wherein the pigs include a novel print shape on at least one end of said pigs to print at least one end of the wieners.

15 23. The method of claim 20, wherein the pigs include a novel print shape on at least one end of said pigs to print at least one end of the wieners.

24. The method of claim 21, wherein the pigs include a novel print shape on at least one end of said pigs to print at least one end of the wieners.

device to force said pigs and the batter through said cooking tube is a magnetic drive system outside said cooking tube which moves said pigs.

11. A method of making a unit product into at least a semi-solid from a liquid batter in a device having a cooking tube; pigs to segment the batter into units, the pigs fitted move inside of the cooking tube; a device to force the pigs and the batter through the cooking tube; and a device to process the batter into the at least semi-solid formed product, the method comprising:

inserting the batter into the cooking tube;

inserting the pigs into the cooking tube, thereby segmenting the batter into units of product; and

processing the batter in the cooking tube to form the at least semi-solid product.

12. The method of claim 11, wherein an inside surface of the cooking tube is of a non-stick material.

13. The method of claim 11, wherein the cooking tube is of a novel shape to produce a novel shaped product.

14. The method of claim 13, wherein the pigs are of a novel shape similar to the novel shape of the cooking tube.

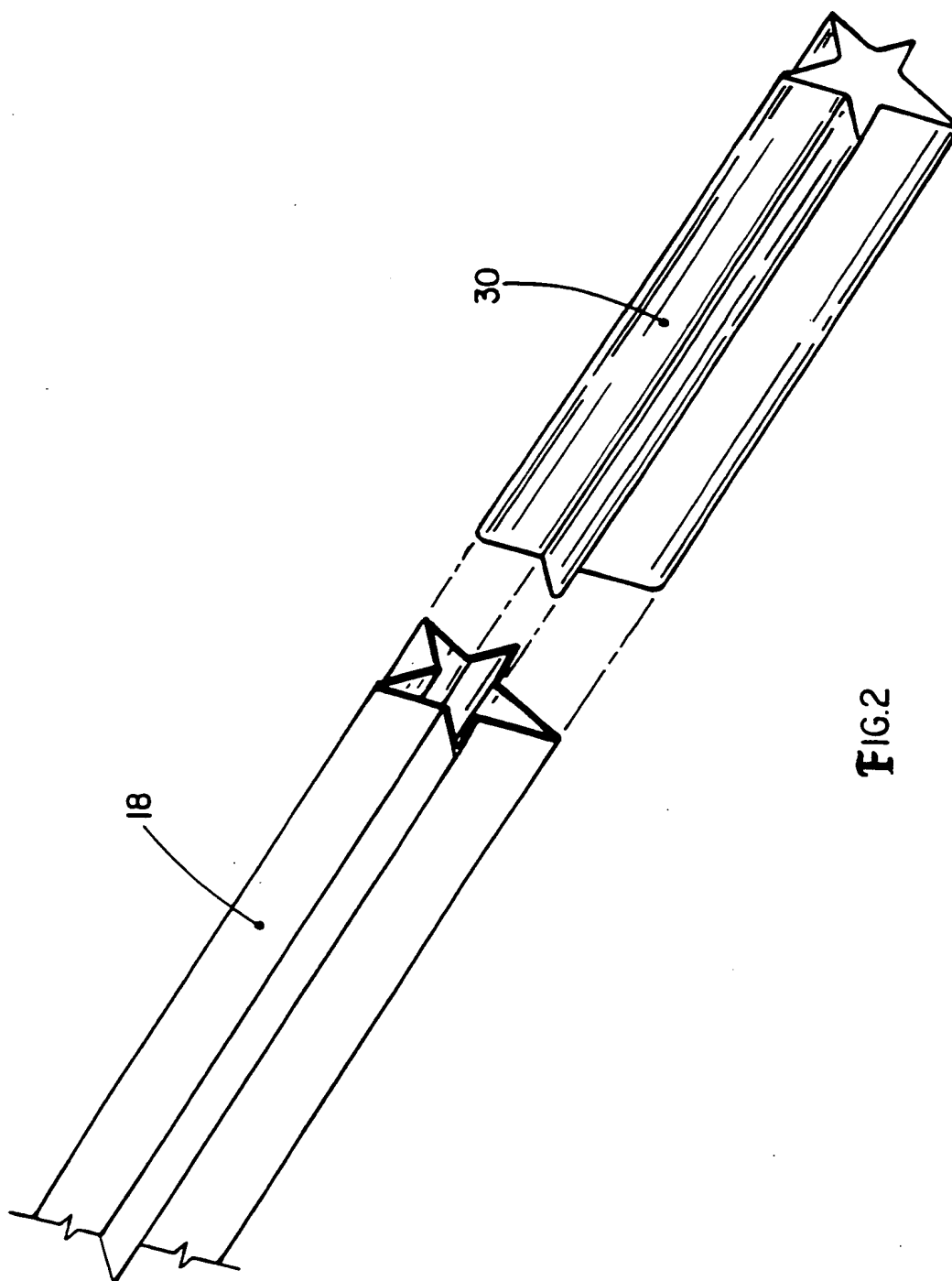
15. The method of claim 11, wherein the pigs include a novel print shape on at least one end of said pigs to print at least one end of the product.

16. The method of claim 13, wherein the pigs include a novel print shape on at least one end of said pigs to print at least one end of the product.

17. The method of claim 14, wherein the pigs include a novel print shape on at least one end of said pigs to print at least one end of the product.

18. A method of making a wieners from a liquid type batter in a device having a cooking tube; pigs to segment the batter into units, the pigs fitted move inside of the cooking tube; a device to force the pigs and the batter through the cooking tube; and a

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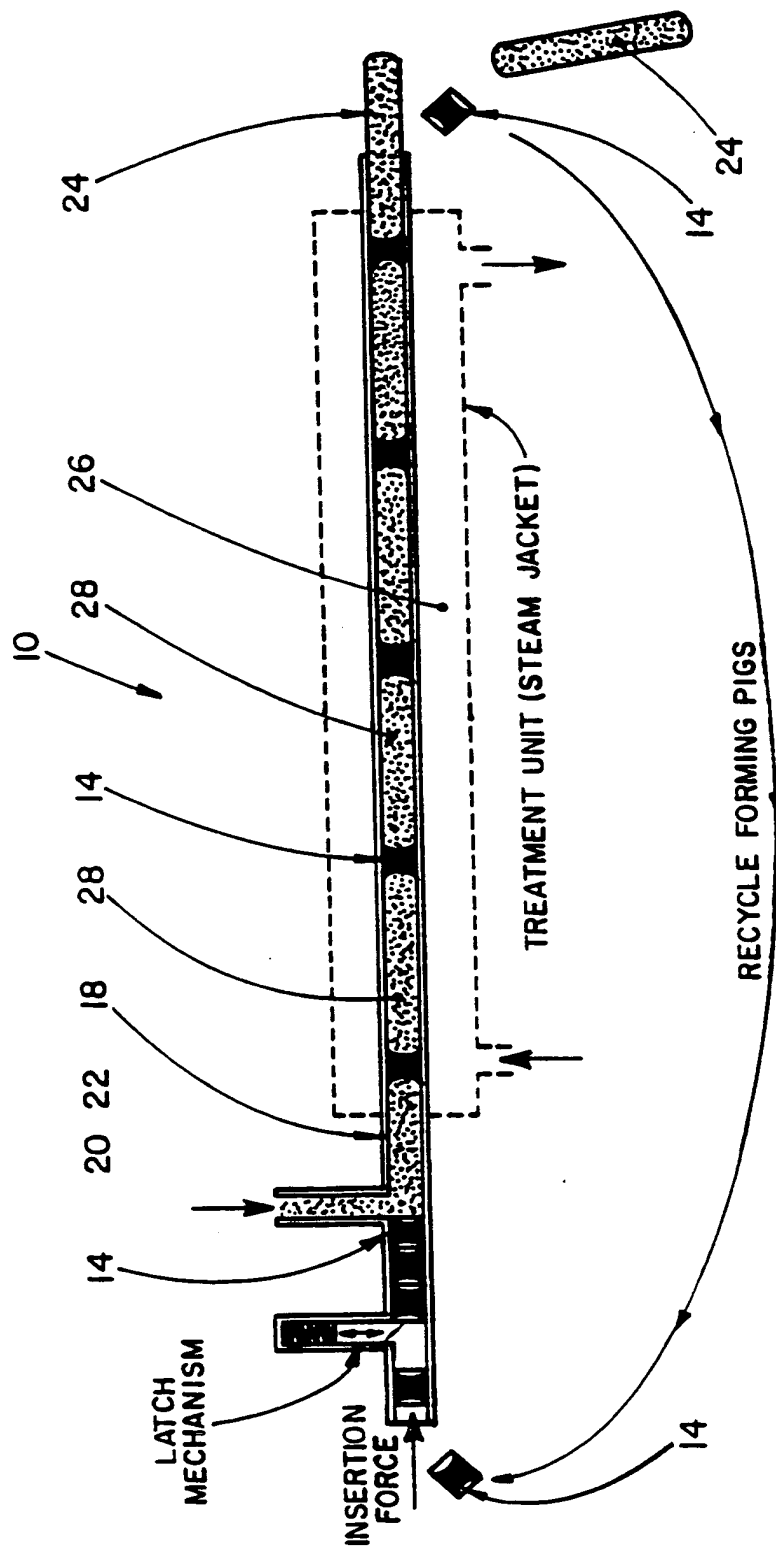


FIG. 1

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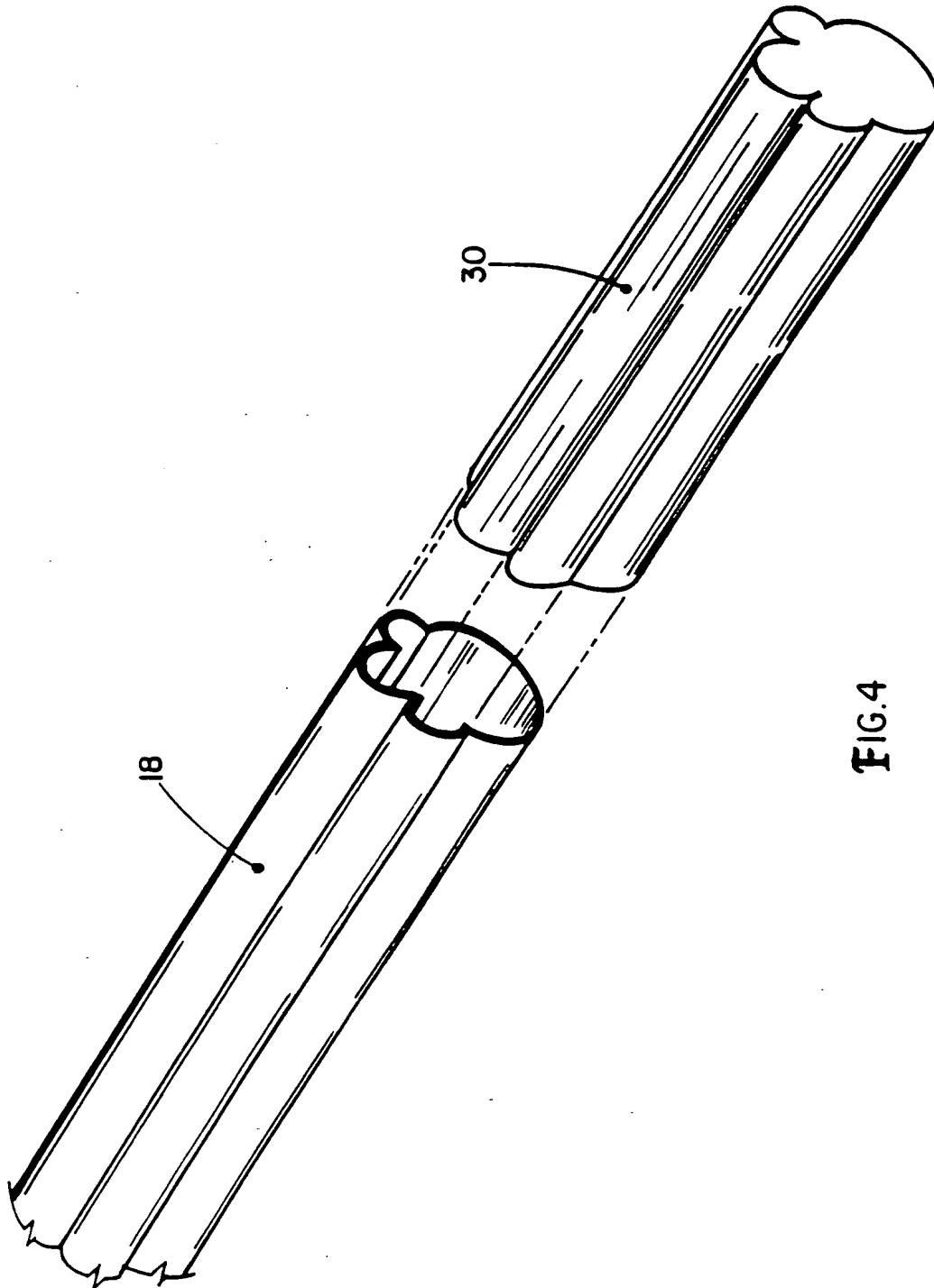
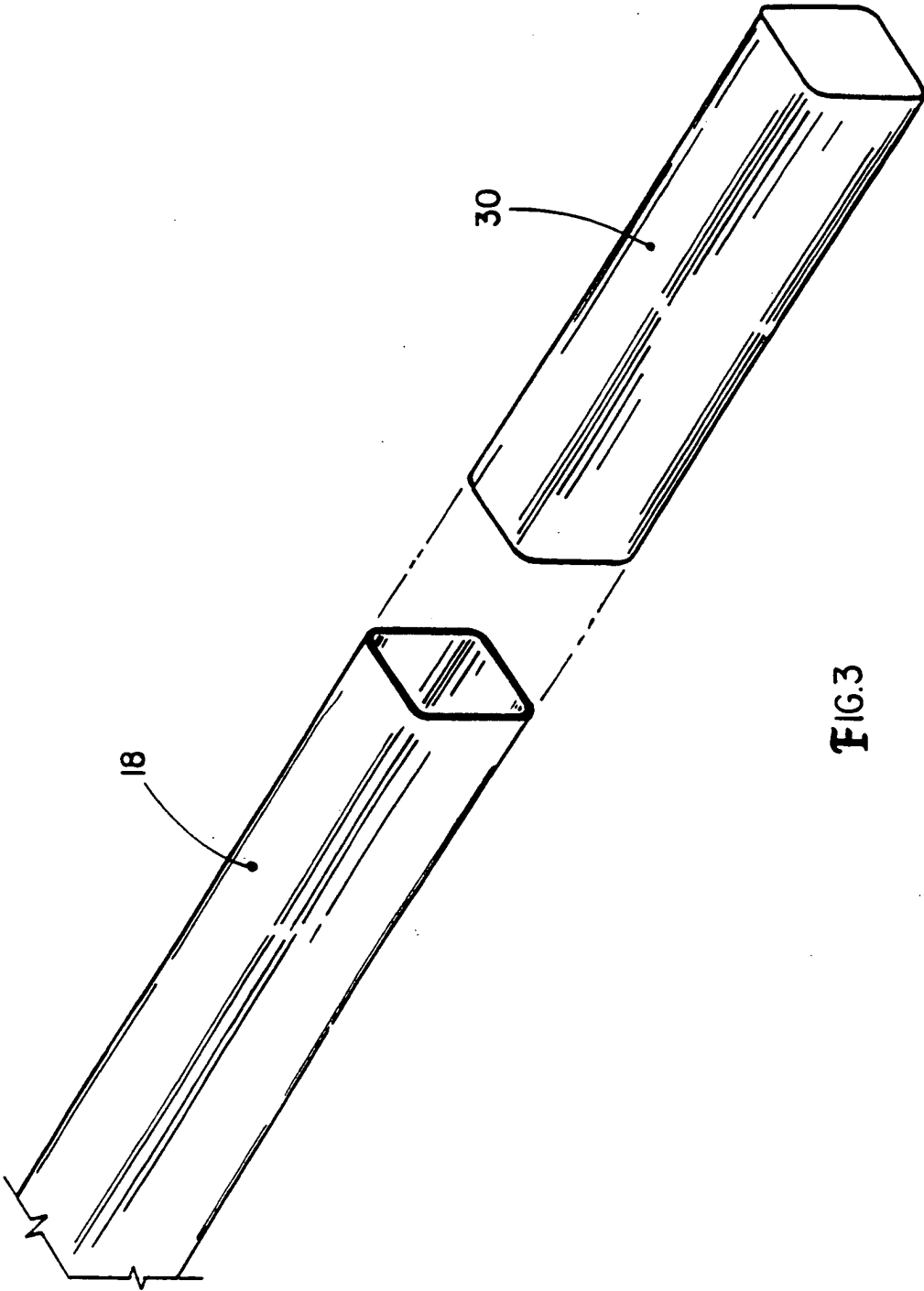


FIG. 4

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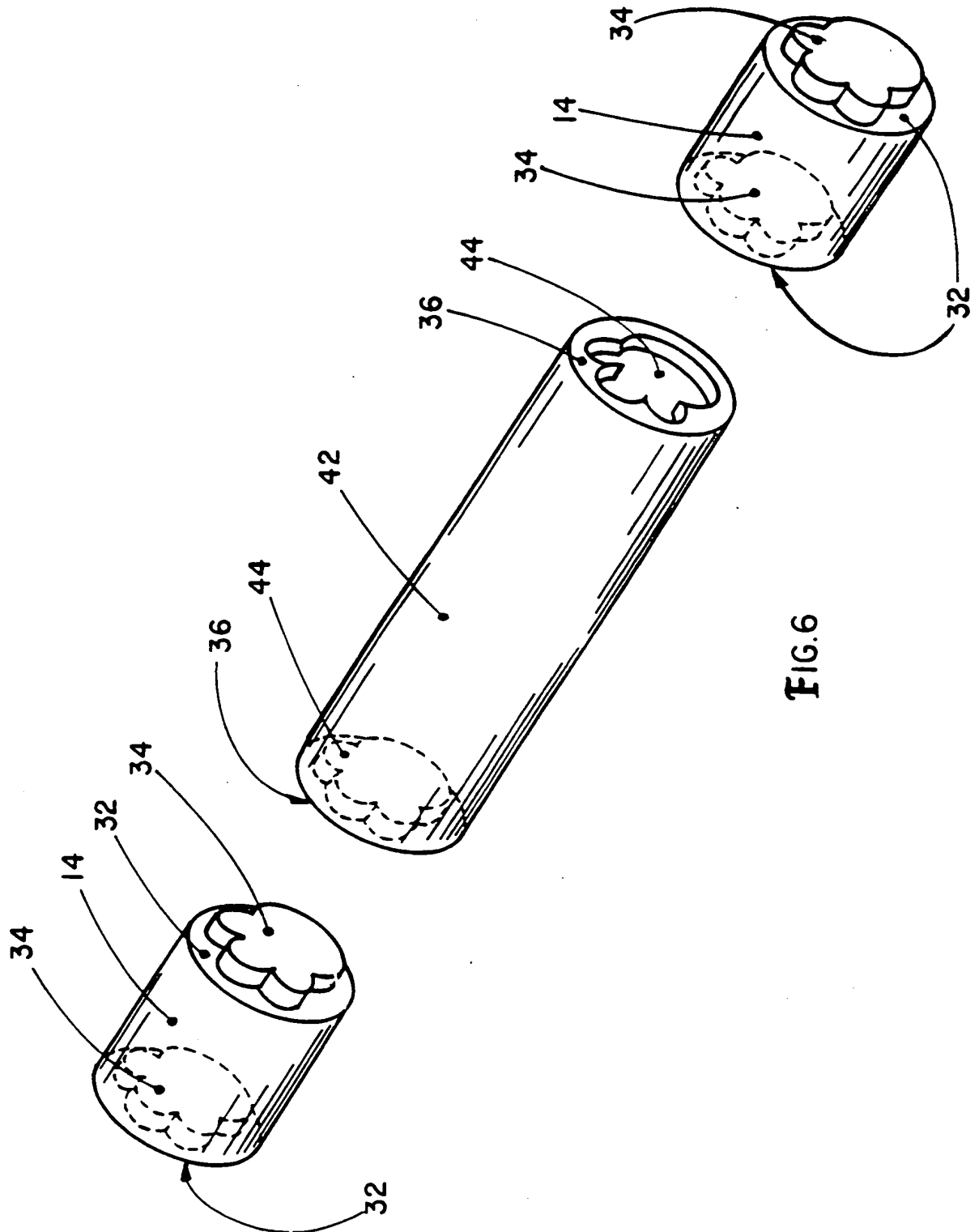
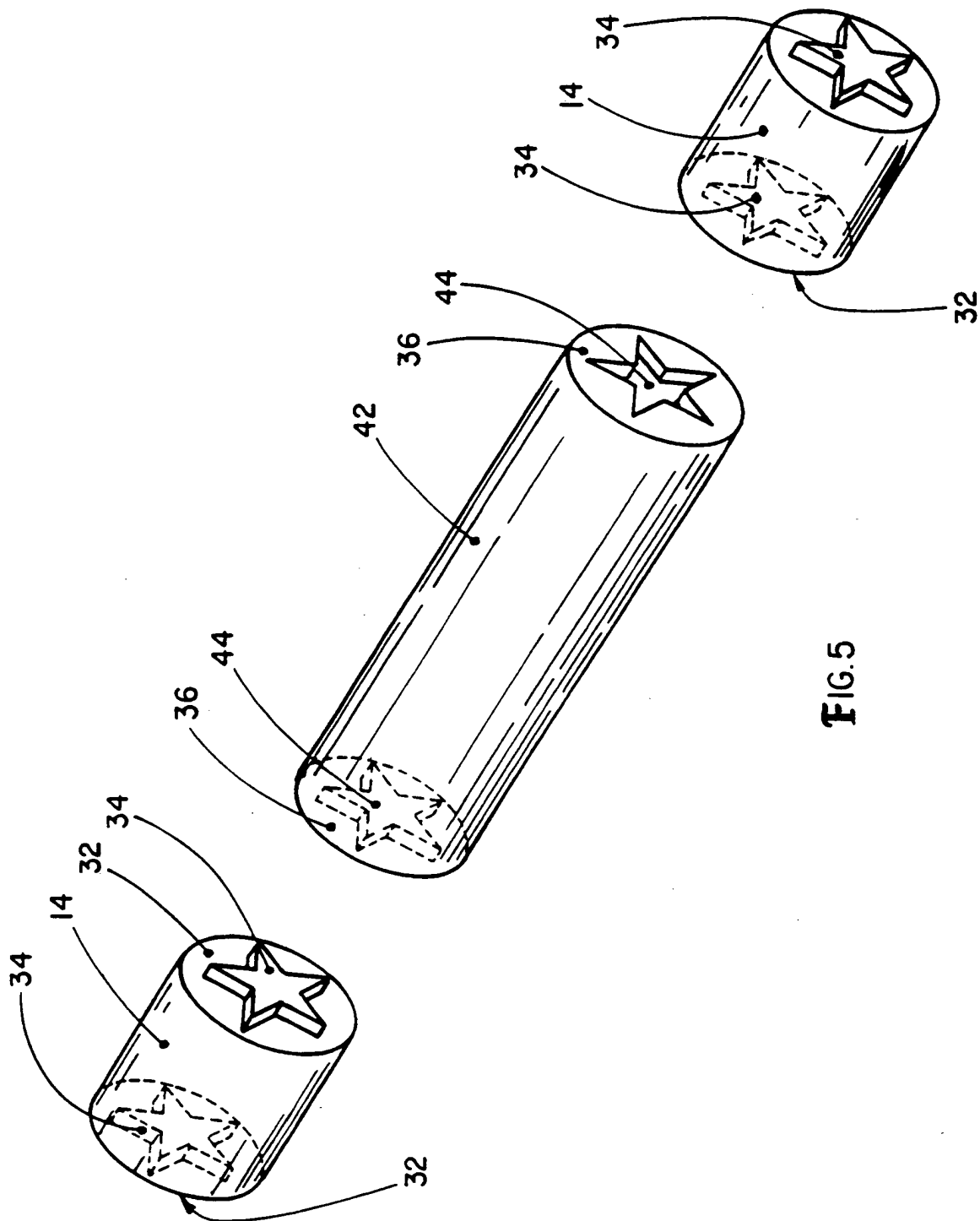


FIG. 6

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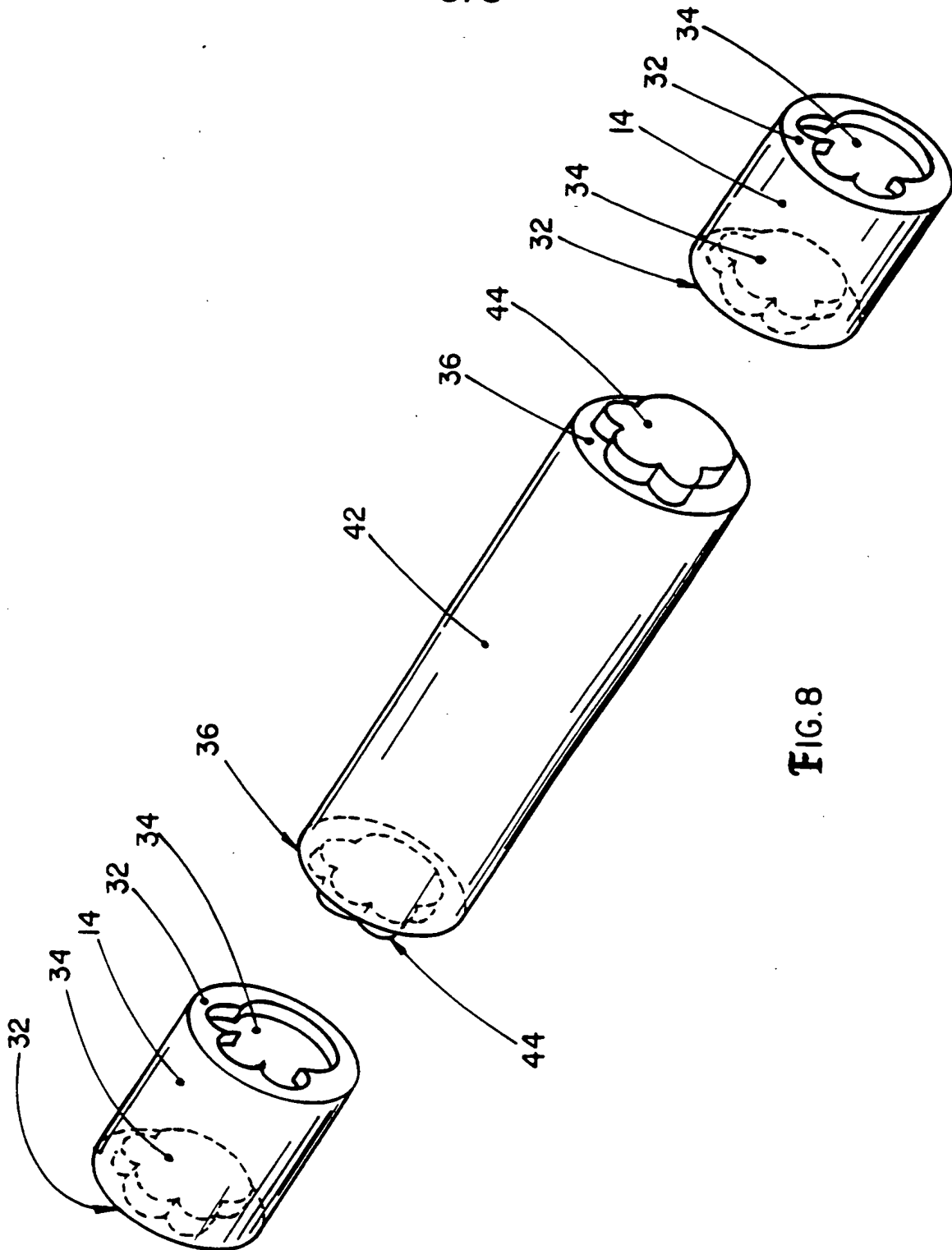


FIG. 8

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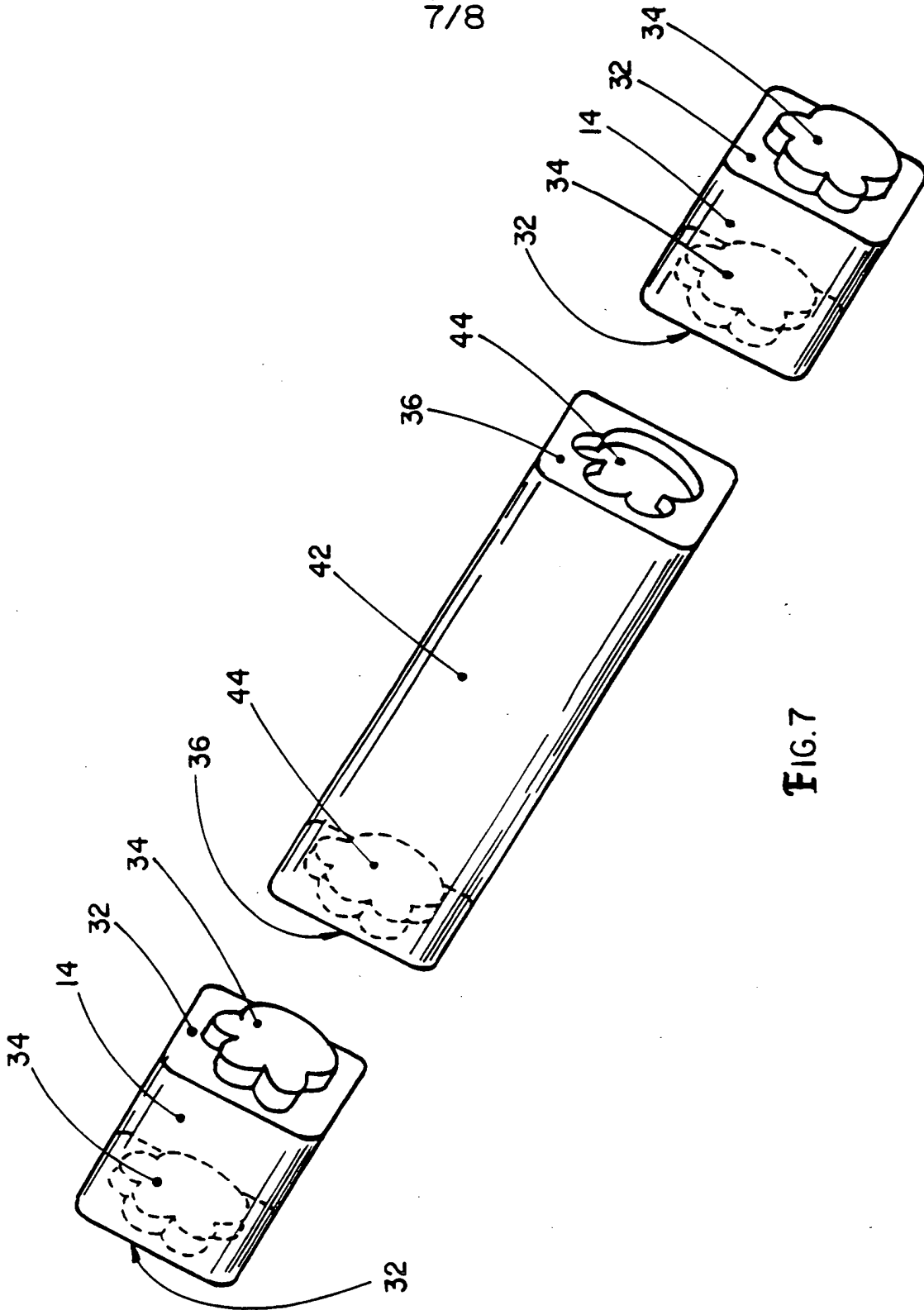


FIG. 7